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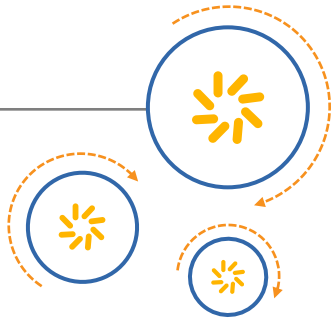

RB02

Product Specification

80-YA116-12 Rev. A

February 3, 2017

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Revision history

Revision	Date	Description
A	Janaury 2017	Initial release

Contents

Figures

Tables

1 Introduction

The RB02 Wi-Fi module provides a highly-integrated and flexible platform for developing and evaluating products and applications based on the QCA4010 SoC. The RB02 module can be either used with RB01 development kit for software development or incorporated into OEM products to enable rapid deployment of Wi-Fi connected systems.

The RB02 module includes the following components:

- QCA4010 chip
- An integrated balun to save cost and size, minimize tuning and tolerance
- A printed antenna
- Apple MFI co-processor
- 2MB SPI Flash memory

The QCA4010 is a single band 1x1 802.11 b/g/n device optimized for low-power embedded applications with single-stream capability for both Tx and Rx. It has an integrated network processor with a large set of TCP/IP with IPv4/IPv6-based services. These services can be accessed via a serial SPI link or by a UART link connected to an external host CPU.

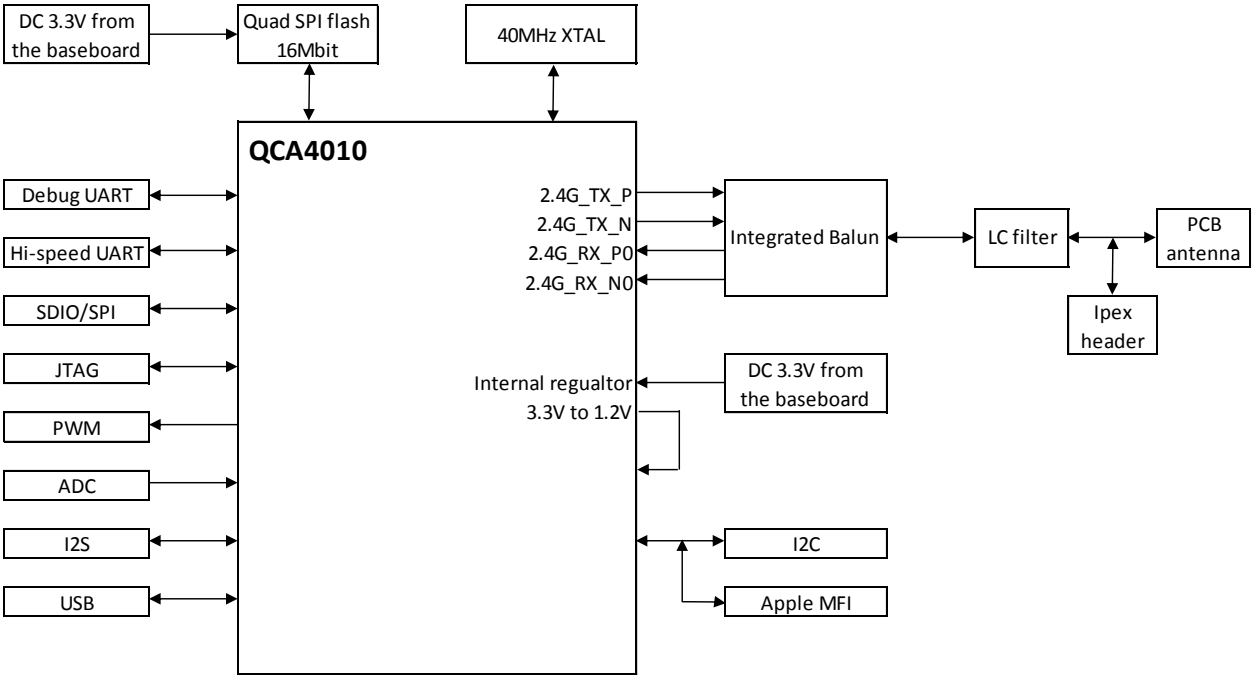

Figure 1-1 RB02 block diagram

RB02 Wi-Fi module features

- IEEE 802.11 b/g/n, single stream 1x1
- Single-band 2.4 GHz
- Integrated PA and LNA; support for external PA and external LNA
- Green Tx power saving mode
- Low power listen mode
- Four-layer PCB design
- FCC certified module from partnersFull security support: WPS, WEP, TKIP, WPA (personal), WPA2 (personal)

RB02 manufacturing interface

- USB 2.0 interface with integrated controller and PHY for manufacturing test and configuration

RB02 host interfaces

- UART host interface to a remote microcontroller with an AT style command set

2 Hardware Specification

2.1 RB02 module pinout

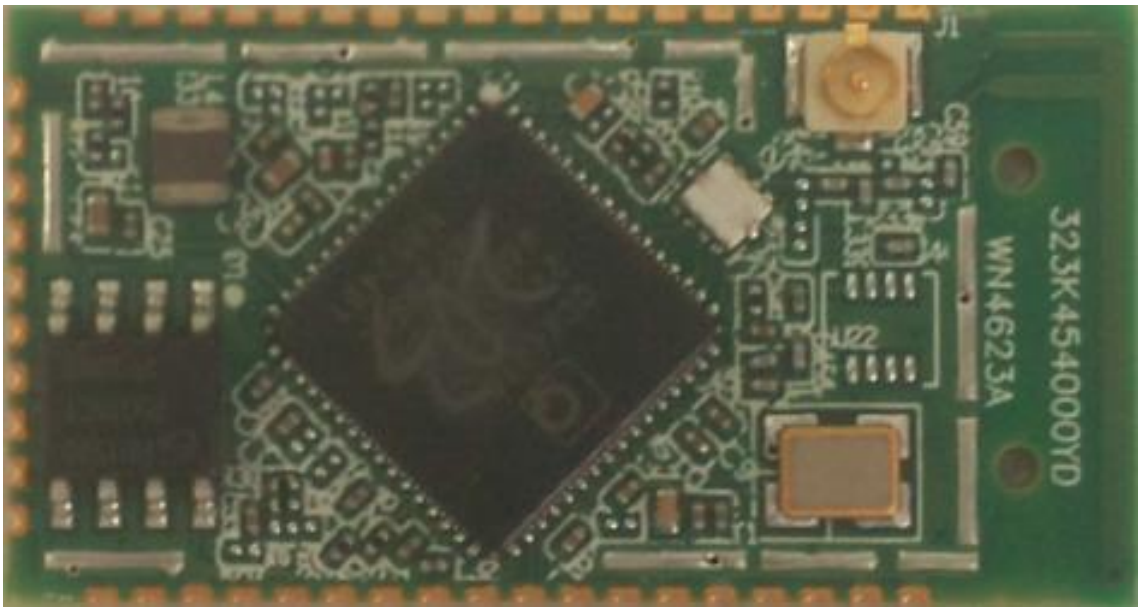

Figure 2-1 RB02 top view

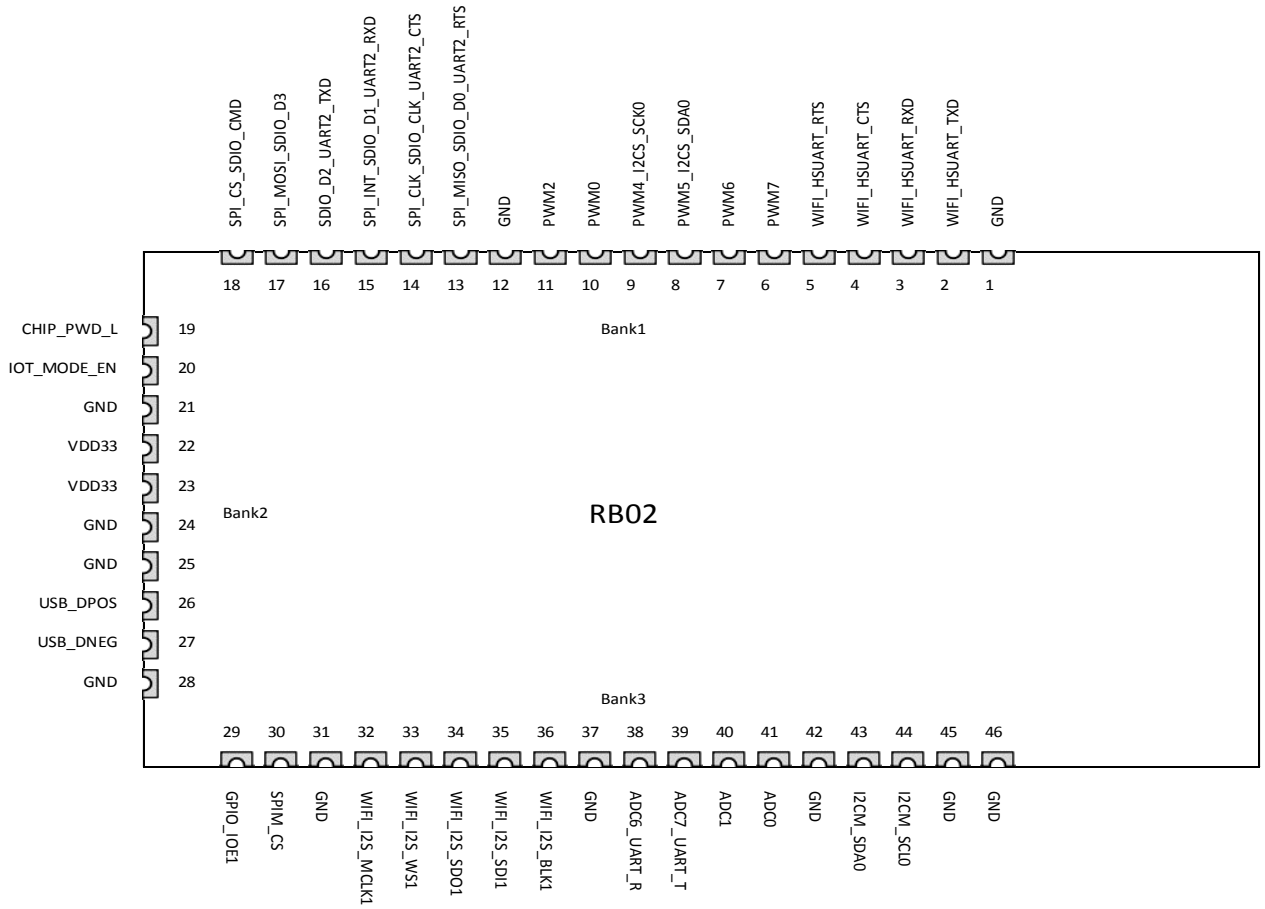

Figure 2-2 RB02 pinout definition

Table 2-1 RB02 module pinout definition and QCA4010 GPIO assignment

Pin	Signal/Interface	ALT1	ALT2	ALT3	GPIO No.
1	GND	Ground			
2	WIFI_HSUART_TXD	High speed UART TXD			GPIO[24]
3	WIFI_HSUART_RXD	High speed UART RXD			GPIO[23]
4	WIFI_HSUART_CTS	High speed UART CTS			GPIO[22]
5	WIFI_HSUART_RTS	High speed UART RTS			GPIO[21]
6	PWM7	PWM7			GPIO[13]
7	PWM6	PWM6			GPIO[12]
8	PWM5_I2CS_SDA0	PWM5	I2C Slave SDA0		GPIO[11]
9	PWM4_I2CS_SCK0	PWM4	I2C Slave SCK0		GPIO[10]
10	PWM0	PWM0			GPIO[6]
11	PWM2	PWM2			GPIO[8]
12	GND	Ground			
13	SPI_MISO_SDIO_D0_UART2_RTS	SPI MISO (master or slave)	SDIO Data0	UART RTS	GPIO[4]
14	SPI_CLK_SDIO_CLK_UART2_CTS	SPI CLK (master or slave)	SDIO CLK	UART CTS	GPIO[5]
15	SPI_INT_SDIO_D1_UART2_RXD	SPI Interrupt (slave)	SDIO Data1	UART RXD	GPIO[3]
16	SDIO_D2_UART2_TXD		SDIO Data2	UART TXD	GPIO[2]
17	SPI_MOSI_SDIO_D3	SPI MOSI (master or slave)	SDIO Data3		GPIO[1]
18	SPI_CS_SDIO_CMD	SPI CS (master or slave)	SDIO Command		GPIO[0]
19	CHIP_PWD_L	Module reset, active low			
20	IOT_MODE_EN	Wakeup manager enable			
21	GND	Ground			
22	VDD33	3.3V power supply			
23	VDD33	3.3V power supply			
24	GND	Ground			
25	GND	Ground			
26	USB_DPOS	USB Data+			
27	USB_DNEG	USB Data-			
28	GND	Ground			
29	GPIO_IOE1	external wakeup			
30	SPIM_CS	Flash memory /CS pin			GPIO[35]
31	GND	Ground			
32	WIFI_I2S_MCLK1	I2S MCLK1			GPIO[33]
33	WIFI_I2S_WS1	I2S WS1			GPIO[32]
34	WIFI_I2S_SDO1	I2S SDO1			GPIO[31]
35	WIFI_I2S_SDI1	I2S SDI1			GPIO[30]
36	WIFI_I2S_BLK1	I2S BLK1			GPIO[27]
37	GND	Ground			
38	ADC6_UART_R	ADC6	Debug UART RXD		GPIO[29]
39	ADC7_UART_T	ADC7	Debug UART TXD		GPIO[28]

Pin	Signal/Interface	ALT1	ALT2	ALT3	GPIO No.
40	ADC1	ADC1			
41	ADC0	ADC0			
42	GND	Ground			
43	I2CM_SDA0	I2C Master SDA0			GPIO[25]
44	I2CM_SCL0	I2C Master SCL0			GPIO[26]
45	GND	Ground			
46	GND	Ground			

2.2 RB02 interface summary

- Host interface: SPI master x 1, SDIO2.0 x 1, debug UART x 1
- High speed UART x 2
  - Up to 3Mbps data rate
- I2C master x 1, I2C slave x 1
  - Standard-mode and fast-mode
- I2S x 1
- PWM x 6
  - 18-bit resolution with 8-bit clock prescaler
- ADC x 4
  - 12-bit resolution, 400 Ksps for multiple channels and 1 Msps for single channel.
- All signal pins can be multiplexed as GPIO
- USB2.0 x 1, for ART tool

2.3 Bootstrap signals

Table 2-2 Bootstrap signals

Pin No.	Bootstrap name	Description	
11	Test mode enable	Should be low while reset released, for normal function	
18 13	Host mode[1] Host mode[0]	Bootstrap for host interface selection. Default mode is 00.	
		00	USB/manufacturing test and configuration/hostless
		01	Hostless (serial AT command) mode
		10	SPI host mode
		11	SDIO host mode
20	IOT mode enable	Keep high always, for normal function	

2.4 Electrical characteristics

2.4.1 General DC electrical characteristics

These conditions apply to all DC characteristics unless otherwise specified: T_{amb} = 25 °C, DD33 = 3.3 V

Table 2-3 DC electrical characteristics for digital I/Os

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IH}	High level I voltage	–	1.8	–	3.6	V
V_{IL}	Low level I voltage	–	-0.3	–	0.3	V
V_{OH}	High level O voltage	–	2.2	–	3.3	V
V_{OL}	Low level O voltage	–	0	–	0.4	V

2.4.2 RB02 radio Rx characteristics

Table 2-4 and Table 2-5 summarize the RB02 Rx characteristics.

Table 2-4 RB02 Main Rx characteristics for 2.4 GHz operation

Symbol	Parameter	Conditions[1]	Min	Typ	Max	Unit
F_{rx}	Rx input frequency range	–	2.412	–	2.472	GHz
S_{rf}	***Sensitivity***					
	CCK	1 Mbps	–	-93	–	dBm
		11 Mbps	–	-87	–	
	OFDM	6 Mbps	–	-89	–	
		54 Mbps	–	-73	–	
	HT20	MCS0	–	-89	–	
		MCS7	–	-70	–	
R_{adj}	***Adjacent channel rejection***					
	CCK	2 Mbps	–	47	–	dB
	OFDM	6 Mbps	–	36	–	
		54 Mbps	–	21	–	
	HT20	MCS0	–	34	–	
		MCS7	–	18	–	
1. In LPL mode, sensitivity will be degraded by 1 – 2 dB.						

2.4.3 RB02 radio Tx Characteristics

Table 2-5 summarizes the RB02 Tx characteristics.

Table 2-5 RB02 Tx characteristics for 2.4 GHz operation

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
F_{tx}	Tx output frequency range	–	2.412	–	2.472	GHz
P_{out}	***Output power[1]***					
	802.11b mask compliant	1 Mbps	–	19	–	dBm
	802.11g mask compliant	6 Mbps	–	19	–	
	802.11g EVM compliant	54 Mbps	–	16	–	
	802.11n HT20 mask compliant	MCS0	–	19	–	
	802.11n HT20 EVM compliant	MCS7	–	15	–	

1. Refer to IEEE802.11 specification for Tx spectrum limits:
   - 802.11b mask (18.4.7.3)
   - 802.11g mask (19.5.4)
   - 802.11g EVM (17.3.9.6.3)
   - 802.11n HT20 mask (20.3.21.1)
   - 802.11n HT20 EVM (20.3.21.7.3)

2.5 Timing specifications

2.5.1 SPI master interface timing

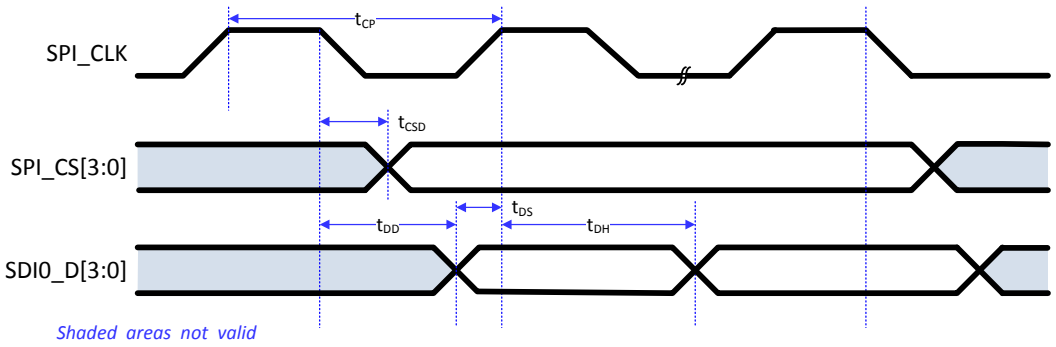

Figure 2-3 SPI master timing

Table 2-6 SPI master timing

Parameter	Description	Min	Max	Unit
t_{CP}	Clock period	30.7	1000	ns
t_{CSD}	Chip select valid delay	-5.5	5	ns
t_{DD}	Data valid delay	-5.5	5	ns
t_{DS}	Data setup	3	–	ns
t_{DH}	Data hold	0	–	ns

3 Mechanical Interface Specification

3.1 RB02 module dimensions

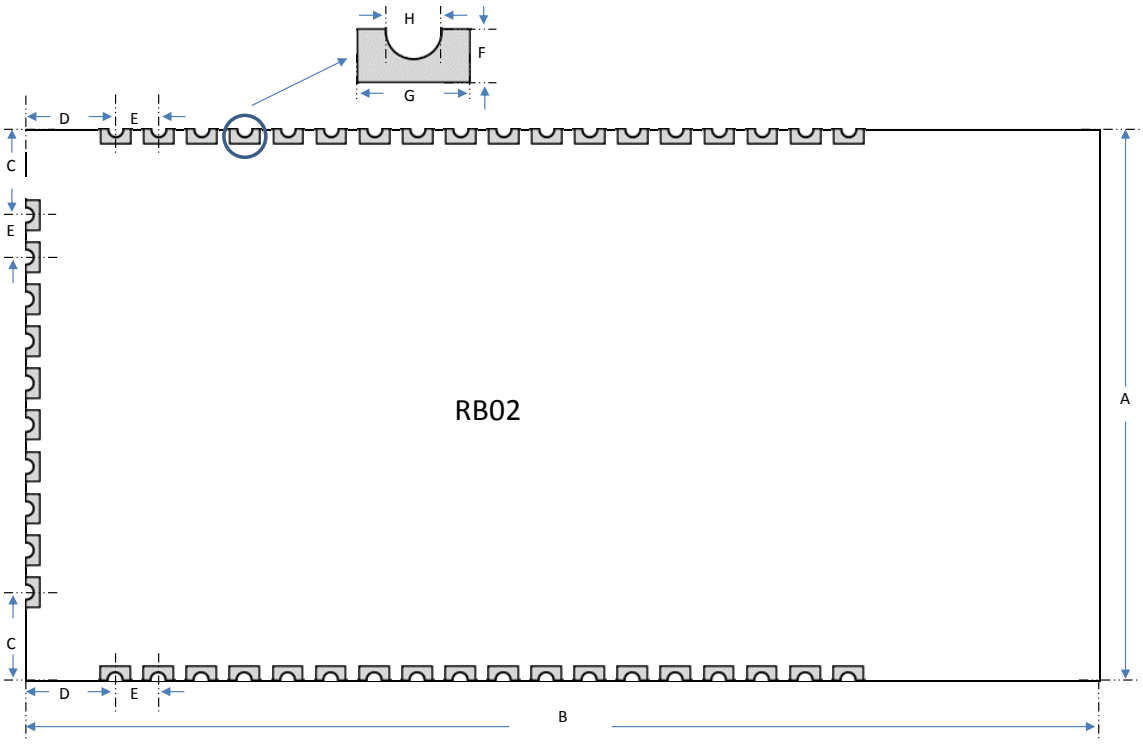

Figure 3-1 RB02 module dimensions

Table 3-1 RB02 module dimensions

Label	Dimension (mm)
A	16
B	30
C	2.285
D	2.54
E	1.27
F	0.4
G	0.7
H (diameter)	0.5
Module height (including the RF shield)	2.6
Total height (with a coax cable plugged into the U.FL connector)	3.6